THURSDAY, NOVEMBER 8, 1883

ZOOLOGY OF THE NORTH ATLANTIC EXPEDITION

The Norwegian North Atlantic Expedition, 1876-1878. Zoology: *Holothurioidea*. By D. C. Danielssen and Johan Koren. With Thirteen Plates and One Map. *Annelida*. By G. Armauer Hansen. With Seven Plates and One Map. (Christiania: Printed by Grondahl and Son, 1882.)

THESE two volumes comprise Nos. VI. and VII. of the results of the Norwegian North Atlantic Expedition. The first, which deals with the Holothurians, contains an interesting account of several new genera (5) and species (6). Of the new forms *Kolga hyalina* is perhaps the most interesting; it has been placed in the family Elpididæ, of the order Elasmopoda, instituted by Dr. Théel for some of the Holothurians collected during the *Challenger* Expedition. Kolga is a small Holothurian (the largest specimen dredged measuring 50mm. in length, 15-20mm. in height, and 12-15mm. in width) with the oral disk facing the ventral, and the anal orifice the dorsal, surface, and having a dorsal collar bearing sucker-like contractile papillæ at the anterior extremity. These papillæ, unlike ordinary pedicels, were found to communicate with the perivisceral cavity by means of spaces formed within the collar.

After referring to lateral and terminal conical suckers, the translucency of the skin, and cutaneous cellular glands, the authors give a careful description of the water vascular system, dwelling especially on the sand canal, which is especially interesting, for instead of hanging free in the perivisceral cavity, as in the ordinary Holothurian, it opens directly to the exterior in front of the collar. The larval condition thus persists, the circular vessel retaining its communication with the exterior through a simple membranous tube. In two other Holothurians from this Expedition, constituting the new genera of Trochostoma and Irpa, the sand canal has the outer end attached to the skin but not in communication with the exterior, and in each case there is a madreporic plate developed on the canal within the point of attachment. In Elpidia there is a similar arrangement, but the madreporic plate is rudimentary or wanting, hence the authors think that Elpidia approximates more closely than Trochostoma and Irpa to the larval stage so perfectly maintained by Kolga. With respect to the blood circulating system, Kolga differs from the general plan in which the dorsal and ventral vessels originate between the stomach and the intestine, for in Kolga they open from a ring encircling the œsophagus, and as this ring has thicker and more muscular walls than the vessels proceeding from it, it is suggested that it may function as a heart.

Of the five nerve trunks which emanate from the oral nerve ring, the two dorsal furnish an offshoot to each of a pair of large vesicles containing otoliths, and the two lateral ventral cords send branches to numerous successive auditory vesicles. Each vesicle contains from 20 to 130 otoliths. Kolga, which is diœcious and in which there is no respiratory tree, may thus be considered to be a very primitive member of the Holothurian group, near which comes Elpidia, the authors disagreeing in this respect with Dr. Théel, who, taking into consideration the bilateral form of Elpidia, gave it a high place amongst Holothurians.

Prof. Steenstrup's and Dr. Lütken's account of *Myriotrochus Rinkii*, St., has been supplemented in the above report from numerous specimens found at Spitzbergen; and *Myriotrochus brevis*, Huxley, is considered to be identical with *Oligotrochus vitreus*, described by Sars in 1865.

In describing the new genus Trochostoma (instituted for *Molpadia boreale*, Sars, *Molpadia oolitica*, Pourtales, *Haplodactyla arcticum*, and a new form, *T. Thomsonii*) the authors discuss at considerable length the function of the respiratory trees, and conclude that they are in all probability secretory organs belonging to the intestines. After dealing with another new genus (Ankyroderma) this very valuable and interesting memoir concludes with a list of the Holothurians collected by the Expedition, and a table showing the depth, temperature, bottom, &c., where each was procured.

The descriptive text is illustrated by thirteen excellent lithographed plates, and a map showing the position of the zoological stations where the various specimens were obtained.

In the memoir on the Annelids collected by the Expedition, Hansen commences by entering a protest against the number of genera instituted in this class by Malmgren, and he especially considers that the distinction on which Malmgren lays so much stress, viz. the difference between the bristles of different members of the class, is not in reality present. The scales, on the other hand, are considered by the author to be much more distinctive specific features, and from the character of the scales accordingly he opposes the wholesale heaping together by Möbius, and after him by Tauber, of proposed genera and species into a single specific group. Of a large number of Annelids procured a description is given only of new species—about 28—and of a few others which are little known. The description of these forms is almost limited to their external characters, especially to the form and structure of the scales.

The Annelids collected are divided into two groups, first, those found in the warm, and next, those from the cold, area. The list containing those from the warm area gives the depth, temperature, &c., at the various stations, but in addition a useful column is added containing their geographical distribution as far as known. A further list appears of the Annelids collected in the cold area arranged under their respective families, from which it appears that most of them are represented in the frigid area, and most of the species occurring there are also found in the fjords and temperate ocean tracts. The author states that there are few indications that the deep bottom-current off the coast of Norway in which the temperature is below zero (C.) should be characterised by a fauna of its own. "Of one Annelid only, *Polynoe globifera*, G. O. Sars, can we infer with comparative certainty that its favourite, if not its sole, habitat is confined to the cold bottom-strata."

From a specimen of Serpula, *Protula arctica*, procured from a depth of 1163 fathoms, temperature – 1°·1 C., bottom biloculina clay, it is inferred that the Serpulidæ do not absolutely require solid matter on which to con-

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struct their shells. From a specimen of *Hydroides Norvegica* met with on a muddy bottom with the tube not, as is usually the case, twisted but straight, it is inferred that in such cases the tubes penetrate the mud like those of many other tube-forming Annelids.

In referring to colour and sense organs, the author says that an *Onuphis hyperborea* brought up from 299 and 412 fathoms, "a greater depth than that to which light and vegetable life are supposed to penetrate," was nevertheless vividly coloured and provided with eyes.

This volume also is illustrated by several plates and a map. The letterpress of both volumes is printed in English and Norwegian in parallel columns. They together form a solid contribution to our knowledge of two groups which are becoming more and more interesting to the zoologist.

A BUSHEL OF CORN

A Bushel of Corn. By A. Stephen Wilson. (Edinburgh: David Douglas, 1883.)

THIS little book is full of originality and force. It appeals it is true to a class, but a large class. The title is happy and suggestive, and is a sufficient text for every paragraph between the covers. It is true the subject is not exhausted, for much more might doubtless be said concerning "a bushel of corn."

But it is with a *bushel* of corn that Mr. Wilson deals. He introduces us to the bushel as an absolute measure of volume, traces its origin, mentions its varieties, discusses its merits, weighs it in the balances of justice, and dismisses it as inadequate, misleading, and impossible as a corn measure. The interest of the reader is at first excited with regard to the evolution of the bushel from terms of Roman *sextars*. Whether statistician, antiquary, historian, miller, or farmer, he must feel his interest awakened and kept alive. The bushel is seen altogether from a new aspect. Light beams out beneath and around it, and it becomes an object of respect and veneration. It is with regret that we find the fact gradually forcing itself upon us that this archetypal standard of volume, this absolute multiple of the typical wheat grain, this original bond of union between volume and weight in "merrie England," is after all as a gauge of value, and an indication of variations in price with regard to corn, an impostor. This is, however, the conclusion to which we are irresistibly driven, and Mr. Wilson, while he fondles and beams upon his bushel, is in reality dealing it its death wound. Never before has such a blow been levelled against the quarter as a measure of value in wheat.

Let any member of Parliament or of a constituency read this volume and he will rise convinced that the bushel is really doomed, and that the *cental* is the only alternative. Or let any one who is imbued with an idea in favour of the French metric system read it, and he will find that we have in England a much sounder system of quantifying than he imagined, and he will think twice before he gives up his English grain for the French gramme, or the English pint for the French litre.

The work naturally divides itself into two parts. First, an interesting inquiry into the historical origin of the bushel. Secondly, an attack upon the bushel as a means of quantifying corn. We propose to look at both these aspects. First, then, in the language of the author, "What is a bushel of corn?" The chief interest in the answer to this question lies in the fact that the bushel is based upon a unit—namely, an increment of wheat. The French have taken distilled water at 4° C. as the medium for connecting weight and volume. The Romans appear to have taken wheat for a similar purpose. The supposed base of the corn measures was not the money sterling of 24 grains used in weighing gold and silver, but the commercial or tron sterling of 32 grains used for heavy goods. In the book known as "*Fleta*" we are told that "in the English kingdoms the king's measure was made from the penny called the sterling, which is made round; that this sterling should weigh 32 grains of average wheat: that twenty pennies make an ounce, and that twelve ounces make a pound of twenty shillings weight and number; that the weight of eight pounds of wheat makes the measure of one gallon; that eight gallons of wheat make the bushel, eight of which constitute the common quarter." The sextar pint of the Romans held one London pound of twenty shillings or 7680 grains of wheat of the quality giving 64 lbs. to the bushel. A bushel was 64 sextars, and hence a London pound of really good wheat and a sextar pint united the ideas of weight and measure. According to this view a bushel of good wheat ought to weigh 64 lbs. and to hold 64 pints. The latter statement is true at the present day, and in certain cases the weight may be 64 lbs. also. Mr. Wilson, however, considers that the typical bushel of wheat was not considered to be 64 lbs., which is unusual, but 60 lbs. And, still further, that the ideal bushel of 60 lbs. was probably 60 lbs. *avoirdupois* and not London. In working out this very interesting point, Mr. Wilson shows that, according to "*Fleta*," a sack of wool was always considered to be of equal weight with a quarter of wheat. Now wool was quantified by tron weight, and if the assumption is correct that wheat was quantified by avoirdupois we can readily see if we can bring the two into accord. "'*Fleta*' tells us that 12½ merchants' pounds of 15 ounces made a stone of wool, and that 28 stones made a sack of wool equal in weight to a quarter of wheat." The weight of the sack of wool would therefore stand thus:—

Tron oz. = 640 grs.
15

Tron lb. = 9600 grs.
12½

Wool st. = 120,000 grs.
28

Sack of wool ... ... 3,360,000 grs. = 480 lbs. avoirdupois.

The comparison with the weight of a quarter of wheat would stand thus:—One bushel of 60 lbs. avoirdupois = 420,000 grs., and 8 bushels or 1 quarter = 3,360,000 grs. = 480 lbs. avoirdupois. The true solution of this difficulty therefore seems to be arrived at, namely, that the bushel of 2218·192 cub. in. is equal to 64 Roman sextars and to 64 English pints. It holds 8 gallons or 64 pints of wine, and 8 gallons or 64 pounds of really good wheat. It is equal in size to the old Scots or Linlithgow firlot, and holds 80 avoirdupois or Roman pounds of water.

The idea of a system of weights and measures based on a sound unit like a sextar pint of twenty shillings,

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